Agricultural production in China’s Guangdong Province, home to about 100 million people, thrives on rice. More than 90% of food produced in Guangdong is rice, and yet, the yields are among the lowest in the country—about 15% lower than the national average.

To help farmers increase rice productivity, a technology package was introduced to help overcome the challenges of rice farming: three controls technology (3CT) and alternate wetting and drying (AWD) of rice paddies. The latter is also described as intermittent irrigation.

3CT and AWD

The 3CT involves a multi-pronged approach: controlling the amount of fertilizer, unproductive tillers, and pests and disease. Following this technique reduces nitrogen input in the soil. It also postpones fertilizer application from the early growth stage to the middle and late growth stages, which leads to sturdier rice plants that are less prone to pests and disease. AWD, on the other hand, is a water-saving technology that saves on irrigation water and reduces greenhouse gas emissions. An added bonus of 3CT and AWD is that the plants develop stronger roots and are able to withstand forceful winds. This is critical during the ripening stage of the crop. If plants are knocked over or lodged by the wind, the crop cannot be harvested by a

Highlights of 3CT

• Substantial reduction in fertilizer use, reduced instances of pests and disease
• Reduced lodging of the crop prior to harvest
• Increased income of smallholder farmers through a reduced cost in inputs and a 10% increase in yield

Highlights of 3CT plus AWD

• Reduced water use for rice production by more than 50%
• Substantial reduction in greenhouse gas emissions
• Increased income of USD 46 per hectare for farmers

A farmer in Yangdong County of Guangdong Province showing the difference between fields applied with the 3CT and farmers' practice.
machine. As a result, the family has to use manual labor that generally requires taking children out of school during the harvest season.

Outscaling through partnerships
The 3CT and AWD technologies were outscaled through the joint collaboration of the Rice Research Institute of the Guangdong Academy of Agricultural Sciences (GDRRI) and the International Rice Research Institute (IRRI) through the Irrigated Rice Research Consortium (IRRC), which is funded by the Swiss Agency for Development and Cooperation (SDC). With the use of the 3CT, farmers enjoy a 10% increase in yield, which is equivalent to an added 0.6 tons per hectare, on average.

Building on the success of the IRRC, the SDC-funded project, Closing rice yield gaps with reduced environmental footprint (CORIGAP), continued to reach more farmers who would benefit from using the 3CT. With adaptive research and novel outreach mechanisms, the 3CT package has been adopted by 40% of farmers in Guangdong. This eventually paved the way to reduce the yield gap in rice production in the province from 39% to 21%.

Following recent large-scale dissemination, the 3CT has been adopted not only in Guangdong but also in the provinces of Jiangxi, Guangxi, Hainan, Fujian, and Zhejiang. About 2.2 million farmers are estimated to be using the 3CT.

Integrating technologies for impact
Through the continued support of the SDC, initiatives of the IRRC-CORIGAP project have created opportunities to optimize rice productivity, allowing GDRRI and IRRI to explore the prospect of integrating other effective technologies, such as the AWD, into the 3CT package. Two years of field trials by the IRRC-CORIGAP research team indicate that the integration of the 3CT and AWD led to better yields and higher economic returns of around USD 46 per hectare than that of using the 3CT alone. More importantly, water use for growing the rice crop was reduced by more than 50% and methane gas emissions were also substantially reduced.

Partnerships for impact
Through the increasing support of the SDC, the strong collaboration between GDRRI and IRRI will ensure that these institutions will be at the helm of developing science-based tools and will seek better ways to enhance smallholder farmers’ livelihoods by improving rice productivity without causing a negative effect on the environment.